Testimony to the House Subcommittee on Space and Aeronautics on the topic of prizes

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15 July 2004 – Washington, DC

Chairman Rohrabacher, members of the subcommittee, it's an honor to be here.

Today I wish to brief you on three subjects: First, the X PRIZE Competition; Second, the critical need to support NASA's plans for the Centennial Challenges; and third, the need to embrace an increased level of risk in our exploration of space.

X PRIZE:
There is little doubt that there is a large and vibrant marketplace of individuals willing to pay for the opportunity to fly into space. Surveys consistently indicate that over 60% of the U.S. public would welcome the opportunity to take such a trip, and the most recent Futron Corporation study quantifies this public spaceflight market at over $1 billion dollars per year during the next twenty years.

Unfortunately, the private spaceships needed to service this market do not yet exist. To solve this challenge, in 1995 I proposed the idea that a prize be offered to the first private team to develop such a ship. In May 1996, in St. Louis under the Arch, with then NASA Administrator and 20 astronauts, the X PRIZE was announced. Ten million dollars was offered to the first team able to privately build a ship and fly three people to 100 kilometers altitude, twice within a two week period.

Today we have twenty-six teams from seven nations competing and we expect a winner of the X PRIZE in the next 3 to 4 months.

The results of this competition have been nothing short of miraculous. For the promise of $10 million, more than $50 million has been spent in research, development and testing. And where we might normally have expected one or two paper designs resulting from a typical government procurement, we're seeing dozens of real vehicles, motors and systems

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being built and tested. This is Darwinian evolution applied to spaceships. Rather than a paper competition with selection boards, the winner will be determined by the actual ignition of engines and the flight of humans into space. Best of all, we don't pay a single dollar until the result is achieved. The bottom line is that prizes work!

I'm also very proud that the X PRIZE has played a roll with NASA in the creation of the newly announced Centennial Challenges. These annual NASA prizes will help encourage out-of-the-box thinking that is sorely needed in our risk averse space community. While the annual budget for NASA's Centennial Challenges is only $25 million today, I imagine a future where 2.5% of the NASA budget, some $400 million, would be offered each year. Entrepreneurs will solve the problems that large bureaucracies cannot. Prizes offer NASA and the U.S. government both fixed-cost science and fixed-cost engineering. More importantly they offer NASA the passion and dedication of the entrepreneurial mind that cannot be purchased at any price.

I encourage the Congress to fully embrace and support the use of prizes by NASA. Admiral Steidle and all of Code T are to be congratulated for their efforts in launching the Centennial Challenges and should be fully supported to encourage this new way of doing business within the Agency.

DETAILS ABOUT PRIZES:

What are the key ingredients that have made the X PRIZE so successful?

I would attribute our success to three key components. First, the rules were well thought through and clearly presented. You'll hear me speak of this over and over again – writing the rules is more than 80% of the battle. Our second key to success was the romance and excitement involved with the prize topic. Suborbital spaceflight included the human element, the potential to create heroes and a personal message to every viewer of the competition, that message being "You can go next!" The third key component was the existence of a business or market to support the teams after the prize was won. The potential for a billion dollar space tourism market has helped teams justify their investments and fuel their enthusiasm.

To what extent has the X PRIZE attracted interest from NASA's traditional contractors to participate?

None of the traditional contractors have demonstrated any interest in the X PRIZE competition. In fact, shockingly, none have had any interest in supporting us as a non-profit educational organization, even though, in my opinion, these large corporations may be one of the greatest beneficiaries from our activities.

The current contracting methods have spoiled the incumbents. They are paid for paper designs and are paid in cost-plus contracts whether they deliver or not.

But luckily, it is not the traditional contractors who we seek to attract with these competitions. They lack the ability to take the risks involved in achieving breakthroughs and to achieve low-cost solutions.

How can prizes be designed and administered to induce the greatest possible innovation?

Writing the prize rules is the most critical step to achieving this goal. Well written rules will deliver breakthroughs, diversity and innovation. Poorly written rules will result in no entries, or worse yet, trivial solutions.

In addition the competing teams must believe that there is an even playing field without bias for a preferred technology or company. Judging must be independent of the offering agency and teams must be left alone to the maximum extent possible.

Should prizes be offered for discrete technologies, or for large technological feats?

The answer is, of course, both. However in the case of discrete technologies, they need to be wrapped into a competition which makes for good theater in some fashion. Remember that teams must create sufficient

interest from a group of potential financiers to underwrite their effort. As such what they are doing must fall into one of the following areas:

- It must be great theater; likely to involve the human element in some fashion.
- It needs to inspire youth and educate the public
- It must attract the attention of the global press
- It must portend a large and vibrant marketplace

For example a device able to detect a bacterium or virus in a 100 grams of soil might be boring, but dress it as a life-detection prize or better yet, a home-land defense pathogen detection prize and the concept will get the attention of the media and corporate sponsors.

Might offering prizes encourage competitors to cut corners when it comes to safety? How can NASA ensure that the technologies resulting from a competition are safe and relevant to NASA's objectives?

I will speak more about risk at the end of this testimony. Safety is a relative issue. It is balanced against many factors. Would you preclude two personally funded bicycle mechanics from Dayton Ohio from building a self launching powered aircraft? Did they cut corners? Who can judge them? If the government attempts to regulate safety issues related to teams competing for prizes, it will kill the potential for innovation.

The goal for the technology resulting from competition is not to put them directly into production or use, it is to explore new approaches or ways of thinking. The idea is to invent the transistor not to perfect the process leading to a Pentium Chip. We should not expect technologies resulting from a competition to be safe – we should expected the technologies to be different and full of potential and possibilities.

Should NASA offer prizes or are they best offered by private organizations such as the X PRIZE?

NASA should most definitely be offering prizes! This is in addition to private organizations, or in cooperation with private organizations like the X PRIZE.

As a taxpayer I can not think of a better thing NASA can be doing with my money than offering prizes.

How involved should NASA be in specifying the technologies that must be developed?

The most dangerous thing NASA could do is to over-specify the rules or specify what technologies should be used. The rule making process will determine the success or failure of a competition. Writing these rules is an art form requiring specifying just enough, but not so much as to limit the creativity of the contestants.

How involved should NASA be in overseeing the work of companies competing? How involved should they be in judging the competition?

Again, oversight of the teams competing needs to be very carefully managed. It needs enough agency involvement to support team needs, clarify rules and must support the credibility of the prize effort with potential sponsors, but should NOT direct their creative approach in any fashion. Teams need to be allowed to explore non-traditional approaches which might seem 180-degrees out of phase with current accepted practices. This is the only way to bring about true breakthroughs.

What needs to happen to transition technologies from a prize winner to a successful ongoing concern? What can the government do to support this transition?

The best way to achieve this lies once again in the writing of the rules. As an example, the X PRIZE chose to require a 3-person vehicle rather than a 1-person ship. The reason for this was to allow for the creation of a capability that would most easily make the transition to a revenue generating spaceship.

ACCEPTING RISK:

Finally I'd like to address the issue of risk. In contrast to individuals who speak about reducing exposure to risk, I want to speak in favor of accepting more risk.

There is no question that there is risk involved in winning the X PRIZE, as well as risk in going to the moon or Mars or opening any portion of the space frontier. BUT, this is a risk worth taking!

As American many of us forget the debt we owe to early explorers. Tens-of-thousands of people risked their lives to open the 'new world' or the American west. Thousands lost their lives and we are here today as a result of their courage.

Space is a frontier and frontiers are risky! As explorers and as Americans, we must have the right to take risks that we believe are worthwhile and significant. We owe it to ourselves and future generations. In a time when people are risking their lives in motor sports or bungee jumping, it seems a bit shallow to be concerned about the risk involved exploring space.

It is also critical that we take risk in our technology development and that we allow for failure. Without risk and without room for failure we can not have the very breakthroughs we so desperately need.

A breakthrough, by definition, is something that was considered a "crazy idea" the day before it became a breakthrough. If it wasn't considered a crazy idea, then it really isn't a breakthrough, is it? It would have simply been an incremental improvement.

Remember those immortal words, "Failure is not an option?" If we live and work in an environment where we cannot fail, than breakthroughs may not be an option either.

I urge both this Committee and NASA to take steps which will help the American people understand that space exploration is intrinsically risky, yet a risk worth taking. Let's make space explorers heroes once again.